

Teacher notes	<h1 style="margin: 0;">Mangrove Challenge</h1>
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Research background

Queensland Museum research into the Water Mouse is a case study of a species threatened with extinction — it shows the devastating environmental pressures faced by native animals that live close to housing estates in coastal areas. Water Mice are unique Australian mammals: they are crab-eating, nest-building mice that live in mangroves, and, along with other rodents and bats, are among our few native placental mammals.

Queensland Museum scientists have tracked the steady decline in Water Mouse numbers in coastal areas of the Gold Coast. Here, in the mangrove and saltmarsh habitats of the Water Mouse, they have observed introduced pest animals such as foxes, spraying for mosquitoes, trampling of nests by cattle and damage caused by vehicles, and acid sulfate soils. These habitats have been preserved in Queensland under the *Fisheries Act 1994*, so the reason for these local extinctions is not clear, and many factors probably contribute. Many of the environmental impacts in Water Mouse habitats could be minimised through education about waste reduction, recycling, chemicals and stormwater, and soil disturbance.

Outcomes

The web page about the Water Mouse and the Mouse Maze game can be used in middle school science (Years 8–9, upper primary), Biology and Marine Science. The ‘Raising wrigglers’ investigation can be used in middle school science, and, with modifications, in Biology as an Extended Experimental Investigation. The ‘Mangrove Challenge: Can we save the Water Mouse habitat?’ is more suited to a Biology Extended Experimental Investigation.

Science Years 1 to 10 Syllabus (1999)

Strand	Levels	Outcomes
Life and Living	4, 5 and 6	4.1, 4.3, 5.2, 5.3, 6.3, DB6.3, DB6.6
Science and Society	4, 5 and 6	(Fair Tests) 4.2, 5.2, D5.5, 6.2

Biology Senior Syllabus (2004)

Key concepts	Key ideas
3, 4, 5	4, 7, 9, 10, 11, 9, 12, 13, 14, 15, 16, 17, 20

Knowledge focus

The ‘Mangrove Challenge’ takes an ecosystems approach to studying the environment, rather than the narrow endangered species focus of many middle school ecology programs. Scientists rank ecosystems as the most important ecological concept. They represent interactions in nature, including human impacts, and show the complexity of the environment. In contrast, an endangered species approach emphasises

government intervention in saving species, rather than the need for personal action. Both approaches can be used in teaching about the environment. The ‘Mangrove Challenge’ provides information about mangrove and saltmarsh ecosystems where Water Mice feed and nest. It also considers how human activity affects environmental factors and makes Water Mouse survival difficult.

>> Bio-indicators

These important indicator species of ecosystem health are frequently used tools in ecological surveys undertaken by Queensland Museum scientists. In mangroves, important bio-indicator species are crabs and mangrove trees. Crabs are important to the recycling of matter in mangroves: they eat decaying organic matter (detritus) and, as they burrow, aerate the stagnant mud near mangrove roots, and bring organic matter to the surface.

>> Potential acid sulfate soils

Acid sulfate soils are a major environmental problem in many parts of coastal Queensland. At one time, potential acid sulfate soils (PASS) were waterlogged marine sand and mud; in these soils, the decay activities of anaerobic bacteria formed iron sulfide, or iron pyrites. Potential acid sulfate soils become a problem if disturbed, when the pyrites they contain react with oxygen to form sulfuric acid, and acid sulfate soils form. The acid, with a pH less than 4, can leach toxic metals such as aluminium from the soil, and cause fish kills.

Language

Students should have a ‘working’ vocabulary of ecology; this should be used and developed during field work and other investigations. Terms such as habitat, ecosystems, community, environmental factors affecting survival and bio-indicators need to be explained.

Practical activities

Inquiry-based learning is the focus here. In the ‘Mangrove Challenge’, students should first develop background ecological knowledge and skills using texts and laboratory activities. Using second-hand data activities in the Teachers’ resources, they will develop a greater knowledge and understanding of mangrove ecosystems, while observing how scientists undertake research. Careful scaffolding is needed before students write and test their hypothesis and plan their field investigation in the mangroves. All field work techniques should be practised at school first, to ensure that students are familiar with all the equipment and methods.

Assessment

The ‘Mangrove Challenge’ is a Biology Extended Experimental Investigation about mangrove ecosystems and human impact. The activity ‘Raising wrigglers’ could be an assessment item.